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after two oppositions than STRÖMGREN's preliminary orbit after one opposition. This orbit was taken up first because it made possible a comparison between the methods in use at the Students' Observatory and those used by Professor STRÖMGREN in the derivation of definitive elements of this asteroid. The orbit of (588) *Achilles* was taken up next. This is nearing completion. It is the plan of the writer to compute definitive orbits of (617) *Patroclus* and (659) *Nestor* as well, so as to afford reliable comparisons in the case of all four asteroids between actual osculating elements and the theoretical orbits based on triangular solutions.

BERKELEY ASTRONOMICAL DEPARTMENT,  
UNIVERSITY OF CALIFORNIA,  
1913, April.

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THE MINOR PLANET 1911 *MT*, (719) *ALBERT*.

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By E. S. HAYNES,  
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The minor planet 1911 *MT* was discovered on the night of October 3, 1911, by PALISA at Vienna. On the following night a second observation was secured by the discoverer and two others by PECHÜLE at Copenhagen. Further observations were prevented by bad weather and the increasing light of the Moon. The rapid direct motion of the planet had marked it as an object of unusual astronomical interest. Therefore, as soon as the waning light of the Moon permitted, an extensive photographic campaign for its recovery was undertaken. Careful examination of the plates secured in this campaign failed to reveal any trails not identifiable with other planets. If images of *MT* existed on any of these plates, they must be so faint as to require detailed examination for their discovery. The problem of determining an approximate orbit of *MT* to guide astronomers in this detailed examination of their photograph was undertaken at Berkeley by Mr. J. H. PITMAN and the writer.

The determination of even an approximate orbit for 1911 *MT* had been looked upon as rather a hopeless task because of the scantiness of the available observational material. The extreme observations of October 4th were separated by an interval of

only  $4\frac{1}{2}$  hours and a geocentric arc of  $8'$ . The problem was rendered still more difficult by the smallness of the geocentric distance. Indeed, the equation in the geocentric distance resulting from a computation neglecting the parallax had no positive root. Very fortunately, however, Professor LEUSCHNER has recently developed a method for complete elimination of the parallax in orbit computations by Laplacean methods. The application of this method to the problem in question resulted directly in an orbit which represented all observations to within their probable relative uncertainties. This orbit, together with a search ephemeris, was published in *Lick Observatory Bulletin*, No. 210.

Using the ephemeris just mentioned, Mr. DAVIDSON discovered three undoubted images of the planet on plates secured at Greenwich on the night of October 11th with the 30-inch reflector. Since the discovery of these observations eight other images have been found at various places and announced as possible trails of *MT*. It was immediately realized that not all of these positions could be represented by any single orbit; but it was hoped that enough of them might prove consistent with the undoubted observations and with each other to justify the definite rejection of all others. Three of the eight observations come near realizing this condition, leaving outstanding relative discrepancies of about twenty or twenty-five seconds of arc. The errors of the photographic observations are certainly large, but probably not as large as this would require; moreover, this orbit is rendered doubtful by certain theoretical considerations. It, therefore, seems advisable not to reject offhand any of the eight observations, but to derive alternative solutions upon the basis of the undoubted observations and all others one at a time so as not to overlook any possibility of deriving the planet's real motion. This program is not yet complete, but it is hoped to have the discussion of all of the observations finished before the next favorable opposition by any of the resulting orbits.

A very unfavorable opposition of 1911 *MT* occurred some time early in the present year. The brightness was in the neighborhood of the twentieth magnitude. Dr. CURTIS of the Lick Observatory kindly offered to make a search for the planet

with the Crossley reflector, and ephemerides based upon the most probable orbit were furnished him. During the course of his search he discovered three minute planets in the immediate neighborhood of the positions indicated by one of the ephemerides. Enough observations of all three were secured to render it certain that none were identical with 1911 MT. This failure to find the planet does not justify the rejection of the orbit upon which the search was based, because the predicted magnitude is very uncertain and the planet may have been in the region photographed, but too dim to be reached even by the Crossley. A more favorable opposition will occur in 1915 and it is hoped that the planet may be recovered at that time.

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A COMPARISON OF PHOTOGRAPHIC WITH THEORETICAL POSITIONS OF MINOR PLANETS: (105)

ARTEMIS, (115) THYRA, (119) ALTHÆA, (133)  
CYRENE, (139) JUEWA, (174) PHÆDRA.

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BY ANNA R. KIDDER,  
University Fellow in Astronomy, 1912-1913.

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“By the will of JAMES C. WATSON, who died in 1880, a fund was bequeathed in trust to the National Academy of Sciences for the purpose of promoting astronomical research.” Among other things, this was to include “the construction of tables of the minor planets discovered by the testator.” In 1901, Professor LEUSCHNER was chosen to direct in person this work, which “was to embrace the numerical development of the perturbations, including terms only of the first order with respect to the mass of *Jupiter*, by HANSON’s method; a correction of the elements by means of the differences between the computed and observed positions for all available oppositions; and the construction of tables to facilitate the computation of positions to the nearest minute of arc, from the date of discovery to 1930.”<sup>1</sup>

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<sup>1</sup> Tables of minor planets discovered by JAMES C. WATSON: ARMIN O. LEUSCHNER, *Memoirs of the National Academy of Sciences*, Volume X.